CHEMISTRY OF FLOUR.

The Technology of Bread-making, including the Chemistry and Analytical and Practical Testing of Wheat, Flour, and other Materials Employed in Bread-making and Confectionery. By Wm. Jago and Wm. C. Jago. Pp. viii+908. (London: Simpkin, Marshall and Co., Ltd., 1911.) Price 21s. net.

THIS, the second, edition of a well-known work has been increased greatly, both in bulk and price, over its predecessors. Mr. Jago has had the cooperation of his son in its preparation.

It is far from easy to review at all adequately a book of 893 pages, and undoubtedly the work would have been of greater value if it had been materially condensed. Like most similar technological works, it commences with a good deal of pure chemistry, which is partly of very elementary character; very nearly all this could have been omitted with advantage.

The new edition contains most of the previous issue in its original form, but supplemented very fully by the additions required to bring it up to date. Whilst this has been done in a most painstaking and satisfactory manner, the practice is a mistaken one, if a really good book is to be produced, however much it may be justified by commercial reasons. As a result, the treatment is unequal; it would be unjust, however, to base any general criticism on these sections.

The usual plan adopted by the authors is to give a full abstract of all scientific papers in any way bearing on their subject. These are ordered, as a rule, in historical sequence, occasionally with the annoying result that, after a paper has been mastered by the reader, he finds the results controverted by the next paper. It is difficult in consequence to make out the authors' own views in places or to take a clear line as to the current opinions on a controversial question. The authors' own researches are interpolated at considerable length, and, though always valuable, their insertion sometimes tends to confuse the reader seeking for definite conclusions rather than the minutiæ of experimental detail.

The chemistry of bread and flour is far from being in such a chaotic state as this work would lead us to believe; it should have been possible to give a precise account of the present position and to indicate the controversial points, leaving the discussion of these at length to separate chapters.

Apart from these defects the book is most complete, and Mr. Jago is at his best in dealing with the more technical side of the question. Such chapters as those on the composition of wheat, the strength, composition, and bleaching of flour are full of valuable information. Mr. Jago, it is interesting to note, cannot agree with the so-called food reformers in their condemnation of our present bread supply, and the evidence he quotes shows that he is supported in this view by all the authorities of repute in this and other countries. The chapters on bread-making, wheat, flour, and bread "improvers" and on the nutritive value of bread, give a complete summary of all that is known at present on these questions.

The subjects of bakehouse design and the machine bakery and its management will appeal specially to those actually engaged in the trade—a baker, seeking to modernise his equipment, will gain the very best value for his outlay by studying them here.

The commercial testing of wheats and flours constitutes a very important section of the work: the subject is a difficult one, and much of the knowledge of it is still regarded as a trade secret. The difficulty chiefly lies in translating the results of the chemical tests into facts. There is much rivalry between the respective merits of the "chemical" and "baking" tests on flour; as Mr. Jago points out, "though baking is after all the final test of flour," chemical analysis is often able, not only to point out a departure from the normal, but, what is more important, to discover the cause. Millers and bakers have been slow as yet to follow the lead of the brewing industry and introduce a chemist into the works, but where this has been done there is abundant evidence that the laboratory work has proved an actual necessity for the maintenance of a uniform product of high quality. A very flattering testimony to this effect from the Ogilvie Flour Mills Co. is quoted in the book The authors give of their best in this chapter, the pages describing the tests made with the aid of the tintometer being of especial interest as affording a means of measuring some of the subtle changes which take place in flour on storage, and giving more than a clue to their causes.

The more purely analytical chapters which conclude the book are in some respects less successful, some of the methods described being antiquated and untrustworthy. None the less, the section is a useful one to bakers' chemists, who will appreciate also the pages devoted to the testing of confectioners' raw materials.

Perhaps the most striking thought after a perusal of the book is how much of the present knowledge of the chemistry of wheat and flour is due to the work of the last few years, particularly to investigations instituted by those only remotely connected with the subject, and performed without thought of pecuniary reward. Additional satisfaction is derived from the consideration that the advance has been mainly made in this country, or by workers in Canada and the United States.

In conclusion, the authors may be congratulated on the result of their labours; they have compiled a dictionary which leaves nothing to be desired in the fulness of its material, and they have earned the gratitude of all future workers in the field.

E. F. A.

THE COLLOIDAL STATE.

Gedenkboek aangeboden aan J. M. van Bemmelen, 1830–1910. Pp. xxix+416. (Helder: C. de Boer, 1910.)

FIFTEEN years ago the number of those investigating the colloidal state would scarcely have reached double figures, and in the text-books of the period the subject received curt dismissal in a few paragraphs. Had it not been for the connection between colloids and dialysis it would have escaped

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mention altogether. The general position of the science was but little advanced beyond where Graham in especial, and others, such as Frankenheim, Lüdwig, Cloetta, and Payen, had left it half a century earlier. Outside Prof. van Bemmelen's work a few scattered papers, mainly on the precipitating power of salts, or on the imbibition of water by organic jellies, made up the literature of the period. Biologists as a class seemed to have forgotten even the name colloid.

The sixty-two original papers gathered into the volume before us is eloquent testimony to the change which has taken place. The colloidal state has become the vogue, and any departure from simple linear relationship in the equilibrium between states of matter is in danger of being called colloidal—subclass adsorption—and so receiving summary and satisfactory explanation.

The historical position is, however, strictly logical, as indeed it must be if it is, in fact, a development of ideas. In the 'fifties and 'sixties of last century much work and speculation were devoted to the colloidal state; Frankenheim's forgotten paper of 1850, for instance, deserves to rank with Graham's masterwork. But the movement soon spent itself for lack of foundations to build upon.

The present era begins in 1873 with the appearance of the remarkable synthesis which van der Waals effected between the Laplace-Young theory of self-attractive matter, purely statical in character, and the doctrines of molecular kinematics as Clausius especially had developed them; and in 1875, with the equally remarkable extension of the theory of energy to include chemical potential which was made by Willard Gibbs. These, together with van 't Hoff's extension of the gas laws to solutes and Arrhenius's conception of electrolytic dissociation, opened the way for a great mass of work on the equilibrium between different states and different kinds of matter which expanded molecular physics into what is now called physical chemistry. This movement in turn has largely spent itself, unfortunately before it has given us a trustworthy specification of the distribution of energy in the fluid and solid states, and the study of the equilibria of matter in mass has, in one direction, been largely replaced by the study of heterogeneous systems in which one at least of the states is not present in mass at all, for this is the distinctive feature of what is called the colloidal state.

The papers in the memorial volume are forcible evidence of the multitude of problems connected with the colloidal state. Surface energy, the condensation of matter on to interfaces, osmotic pressure and dialysis, the physical state of soils, colloids in geology, viscosity, precipitation, and contact potential all are dealt with. The subject-matter of the paper by M. Duhem, which opens the series, must have been peculiarly grateful to van Bemmelen, for it is a protest against the application of thermodynamics to colloids on the assumption that they are multiphase systems. Twelve years ago the writer of this notice received from Prof. van Bemmelen a long letter of protest against any attempt to apply the phase rule to colloids, and the protest was in the main just. Equally favourable must have been his reception of Malfitano's protest against certain arbitrary distinctions which have become current, chiefly the distinction between chemical combination and adsorption. The distinction may have to be made, but it needs more subtle treatment than it usually receives.

Van Bemmelen's first work on colloids was his paper of 1877 on the absorptive property of soil, his last the paper, "Die Absorption, X.," of 1909. He was nearly fifty, an age when many cease active research, before he began his life-work. As van Bemmelen was led to colloids by his study of soils, it is but fitting that the volume should contain an important group of papers on colloids of the soil and in geology. Rohland, Hissink, Leopold, van Baren, Ehrenberg and Pick, Holwerda and Hudig write on these subjects. M. le Chatelier deals with the mechanical properties of mixtures of solid and liquid in a paper which is remarkable in that it makes no mention of Osborne Reynolds's work.

It is not possible to accord even the briefest notice to all, and contributions by Pappada, Tamman, Barus, Jordis, Freundlich, Spring, Svendburg, Bredig, Ringer, Schreinemakers, Lorentz, and others must be passed by with the remark that, as many of them will not appear in print elsewhere, the volume must be consulted by all workers on colloids.

His eightieth birthday saw van Bemmelen stricken with what proved to be his last illness. His modest soul was, above all whom the writer has known, superior to the need of praise. Thirty years' patient labour in a neglected field of science proves this. Yet one likes to think that so abundant testimony to regard and esteem brought joy and courage in those last hours.

W. B. HARDY.

THE ANALYSIS OF DYES AND DYED MATERIALS.

Identification of the Commercial Dyestuffs: being vol. iii. of a Method for the Identification of Pure Organic Compounds by a Systematic Analytical Procedure based on Physical Properties and Chemical Reactions. By Prof. S. P. Mulliken. Pp. vi+274. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1910.) Price 21*s*. net.

THE identification of natural or artificial dyestuffs either as such or in association with textile fibres, colour lakes, paper, food, or other articles, is a problem which at the present day presents many difficulties. Twenty or thirty years ago the number of dyestuffs was so small that their identification by an expert was a simple enough matter, but the enormously greater number of artificial dyestuffs now in use and the rapid rate at which this number is daily augmented, has not only greatly increased the difficulty, but also the need of trustworthy means of analysis. The dyer with many hundreds of dyestuffs now at his command is able to match any particular shade in a variety of different ways, but since the fastness for the purpose in view depends entirely upon a suitable choice of colouring matters, it becomes particularly important that in matching an approved pattern it should be possible not only to reproduce the shade, but also to

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